

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (Currently amended): An internal combustion engine with at least one engine member, the engine member including:

- a combustion chamber of a combustible mixture with fuel and oxidant components fitted with a compression system,
- an ignition system of the combustible mixture by an igniter,
- sequential let-through devices for the fuel and oxidant components and for the combustion products,

wherein

the ignition system includes a closed head substantially spherical with a wall enclosing the igniter in a precombustion chamber, the head including a set of orifices intended to communicate the combustion chamber and the precombustion chamber so that combustible mixture may flow into the precombustion chamber,

and at least one of the let-through devices is a direct injector in the combustion chamber for the fuel and/or oxidant components, in all or in part, the fuel being injected directly and exclusively in the combustion chamber,

wherein at least one orifice has dimensions of passageway not letting through a flame front from the precombustion chamber to the combustion chamber while letting through unstable species resulting from the combustion in the precombustion chamber in order to enable self-ignition of the combustible mixture of the combustion chamber.

2. (Previously presented): An engine according to claim 1, wherein at least one orifice has dimensions of passageway letting through a flame front from the precombustion chamber to the combustion chamber.

3. (Canceled)

4. (Currently amended): An engine according to claim 3 1, wherein the set of orifices have dimensions of passageway not letting through the flame front from the precombustion chamber to the combustion chamber while letting through unstable species.

5. (Currently amended): An engine according to claim 3 1, wherein each orifice not letting through the flame front has a diameter smaller than 1 mm.

6. (Currently amended): An engine according to claim 3 1, wherein each orifice has a length smaller than its diameter.

7. (Previously presented): An engine according to claim 1, wherein the separation wall of the head between the precombustion chamber and the combustion chamber is made of a material with thermal conductivity greater than 10 W/K/m.

8. (Previously presented): An engine according to claim 1, wherein the separation wall of the head between the precombustion chamber and the combustion chamber is made of high conductivity copper alloy (CuCr1Zr).

9. (Previously presented): An engine according to claim 1, wherein the orifices of the head are minimum three in number.

10. (Previously presented): An engine according to claim 1, wherein the compression system is a piston in a cylindrical combustion chamber with central axis, the injector being arranged substantially axially opposite the piston and the ignition system laterally with respect to the injector, and the orifices are predominantly arranged axially to ensure homogeneity of the combustion of the combustible mixture substantially in the whole combustion chamber.

11. (Previously presented): An engine according to claim 1, wherein the compression system is a piston in a cylindrical combustion chamber with central axis, the ignition system

being arranged substantially axially opposite the piston of the injector laterally with respect to the ignition system, and the orifices are distributed regularly on the surface of the head to ensure homogeneity of the combustion of the combustible mixture substantially in the whole combustion chamber.

12. (Previously presented): An engine according to claim 1, wherein the compression system is a piston in a cylindrical combustion chamber with central axis, the injector and the ignition system being arranged laterally with respect to said axis, and the orifices are predominantly arranged axially to ensure homogeneity of the combustion of the combustible mixture substantially in the whole combustion chamber.

13. (Previously presented): An engine according to claim 1, wherein the head is arranged on a portion of the path of the fuel components injected so that said head may be wetted by said fuel components during the direct injection thereof.

14. (Previously presented): An engine according to claim 1, wherein the ignition system with its head are a single component which replaces a traditional sparking plug and which does not require any modification of the passageway of cylinder head.

15. (Previously presented): An engine according to claim 1, wherein the fuel is exclusively liquid, notably petrol.

16. (Currently amended): A method of ignition of an internal combustion engine having at least one engine member, the engine member including:

- a combustion chamber of a combustible mixture with fuel and oxidant components fitted with a compression system,
  - an ignition system of the combustible mixture by an igniter,
  - sequential let-through devices for the fuel and oxidant components and for the combustion products,
- wherein

~~one implements an~~ the ignition system ~~including includes~~ a closed head ~~substantially spherical~~ substantially in the shape of a half-sphere or a portion of a half-sphere, with a wall enclosing the igniter in a precombustion chamber, the head including a set of orifices intended to communicate the combustion chamber and the precombustion chamber so that combustible mixture may flow into the precombustion chamber,  
~~and said method comprising:~~

~~one introduces~~ introducing directly in the combustion chamber the fuel and/or oxidant components, in all or in part, through one of the let-through devices which is a direct injector, the fuel being injected directly and exclusively in the combustion chamber,

~~one introduces~~ introducing moreover at least some oxidant components in said combustion chamber in order to form the combustible mixture,

~~one causes~~ causing an ignition of the combustible mixture in the precombustion chamber by the igniter, the orifices of the precombustion chamber enabling the ignition of the combustible mixture of the combustion chamber,

said method comprising letting through the orifices some unstable species resulting from the combustion in the precombustion chamber in order to enable self-ignition of the combustible mixture of the combustion chamber without however letting through the flame front from the precombustion chamber to the combustion chamber.

17-18. (Canceled)

19. (New): An internal combustion engine with at least one engine member, the engine member including:

- a combustion chamber of a combustible mixture with fuel and oxidant components fitted with a compression system,
- an ignition system of the combustible mixture by an igniter,
- sequential let-through devices for the fuel and oxidant components and for the combustion products,

wherein

the ignition system includes a closed head substantially spherical with a wall enclosing the igniter in a precombustion chamber, the head including a set of orifices intended to communicate the combustion chamber and the precombustion chamber so that combustible mixture may flow into the precombustion chamber,

and at least one of the let-through devices is a direct injector in the combustion chamber for the fuel and/or oxidant components, in all or in part, the fuel being injected directly and exclusively in the combustion chamber,

wherein the ignition system with its head are a single component which replaces a traditional sparking plug and which does not require any modification of the passageway of cylinder head.